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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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11/21/2003

Joseph John Shiang

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01/18/2006

GENERAL ELECTRIC COMPANY
GLOBAL RESEARCH
PATENT DOCKET RM. BLDG. K1-4A59
NISKAYUNA, NY 12309

EXAMINER

CANNING, ANTHONY J

ART UNIT

PAPER NUMBER

2879

DATE MAILED: 01/18/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/725,724	SHIANG ET AL.	
	Examiner	Art Unit	
	Anthony J. Canning	2879	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 November 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Acknowledgement of Amendment

1. The amendment to the instant application was entered on 7 November 2005.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1, 2, 6, 9, 12, 13, 15, 16, 18-20 and 22 are rejected under 35 U.S.C. 102(e) as being anticipated by Hung (U.S. 6,208,077 B1).
4. As to claims 1, 20, and 22, Hung discloses an organic electroluminescent light emitting device and a method of manufacturing, comprising: a first electrode (see Fig. 3, item 304; column 3, line 57); a second electrode (see Fig. 3, item 308; column 3, line 59); at least one organic light emitting layer (see Fig. 3, item 310; column 3, line 58); and a ceramic output coupler (see Fig. 3, item 306; column 4, lines 1-10; column 5, lines 39-43; fluorocarbons are porous insulating materials). Ceramics as a material contain a plurality of voids distributed therein.
5. As to claim 2, Hung discloses the device of claim 1, wherein: the device comprises an organic light emitting diode (column 5, lines 7-14; electron hole recombination is a hallmark of a

semiconductor, and since the recombination leads to the emission of a visible photon it is a light emitting diode); and the ceramic output coupler comprises a ceramic layer containing a light emitting surface of the device (see Fig. 3, items 306, and 310; the output coupler, 306, is adjacent to the light emitting layer, 310).

6. As to claim 6, Hung discloses the device of claim 2, further comprising a transparent substrate between the ceramic output coupler and the at least one organic light emitting layer, wherein the index of refraction of the ceramic output coupler differs by 0.1 or less from an index of refraction of the substrate (column 4, lines 1-10 says that the substrate can be transparent or opaque and any suitable material can be used; therefore, the material of the substrate can be chosen to have an index of refraction of 0.1 or less from the index of refraction of an insulating fluorocarbon).

7. As to claim 9, Hung discloses that the shaped ceramic material is attached to the organic light emitting diode (see Fig. 3, items 306 and 310, and corresponding description; the output coupler (306), is shaped to be a thin film layer).

8. As to claim 12, Hung discloses the device of claim 2, wherein the ceramic output coupler randomly volume scatters light emitted by the organic light emitting (column 5, lines 39-43 because fluorocarbons are porous, light will be randomly scattered by the pores in the fluorocarbon layer).

9. As to claim 13, Hung discloses the device of claim 12, wherein the ceramic output coupler comprises an organic light emitting diode (column 5, lines 7-14; electrode hole recombination is a hallmark of a semiconductor, and light emitting diode), and the ceramic output coupler volume contains voids which randomly scatter light emitted by the light emitting

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diode see Fig. 3, items 306, and 310; the output coupler, 306, is adjacent to the light emitting layer, 310).

10. As to claims 15 and 16, Hung et al. disclose that the ceramic output coupler can be CuPc (column 4, lines 46-48), which is a light emitting semiconductor. Electrons in semiconductors can be excited to the conduction band by some sort of external energy. When this occurs the electrons recombine with holes and relax back down to the valence band via photon or phonon emission. Photon emission gives off light of a specific wavelength, the examiner interprets CuPc to be phosphorescent since the same mechanism takes place when phosphors give off light.

11. As to claims 18 and 19, Hung discloses that the ceramic output coupler can be CuPc (column 4, lines 46-48). Copper phthalocyanine is a light-emitting semiconductor.

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later

invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

13. Claims 3-5, 7, 8, 14, and 17 rejected under 35 U.S.C. 103(a) as being unpatentable over Hung (U.S. 6,208,077 B1).

14. Hung is silent in regards to the characteristics of ceramic substrate (see Fig. 3, item 302; column 4, lines 1-10). Because Hung says that any appropriate ceramic or semiconductor wafer can be used as the substrate, the substrate can also be viewed as an output coupler. It would have been obvious to one having ordinary skill in the art at the time the invention was made to match the proper indices of refraction to fit the other layers to have a device that has the brightest clearest pictures.

15. Claims 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hung (U.S. 6,208,077 B1) in view of Schnitzer et al. (Appl. Phys. Lett. 63 (16)).

16. As to claim 10, Hung et al. disclose the device of claim 9. Hung et al. are silent in regards to describing that the shaped ceramic material comprises translucent ceramic material having a corrugated or dimpled light-emitting surface.

Schnitzer et al. disclose that the shaped ceramic material comprises translucent ceramic material having a corrugated or dimpled light-emitting surface (see Fig. 1, item b; page 2174, left hand column, lines 18-23). Schnitzer et al. further disclose that this is a means to overcome the gap between internal efficiency of LEDs and their external efficiency.

Therefore, it would have been obvious to one having ordinary skill in the art, at the time the invention was made, to modify the organic light emitting device of Hung to include that the

output coupler is made a shaped ceramic material that comprises translucent ceramic material having a corrugated or dimpled light-emitting surface, as taught by Schnitzer et al., for the added benefit of improving the total efficiency of the light emitting device.

17. As to claim 11, Hung et al. and Schnitzer et al. disclose the device of claim 10. Claim 11 discloses the claimed invention except for each dimple has a height greater than 0.1 microns and a spacing between dimple or corrugation peaks is a factor of 10 or less of the dimple height. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have each dimple has a height greater than 0.1 microns and a spacing between dimple or corrugation peaks is a factor of 10 or less of the dimple height, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

18. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hung (U.S. 6,208,077 B1) in view of Lai et al. (Improved External Efficiency of Light Emitting Diode using Organic Thin Film).

19. As to claim 21, Hung discloses the method of claim 20, further comprising: forming the first electrode of a transparent conductive material over a first surface of a glass or polymer substrate (see Fig. 2, item 204; column 3, lines 47-48; column 4, lines 1-10, glass and polymer as substrates falls into this category); forming the at least one organic light emitting layer over the first electrode (see Fig. 2, item 210; column 3, line 50); forming a second electrode of a metal material over the at least one organic light emitting layer (see Fig. 3, item 308; column 4, lines 11-26; either the cathode or the anode needs to be transparent, depending on the viewing side,

the other electrode can be metal). Hung fails to disclose that the ceramic output coupler over the second surface of the glass or polymer substrate.

Lai et al. disclose an organic light-emitting device wherein the ceramic output coupler over the second surface of the substrate (see Fig. 1 and corresponding description). Lai et al. further disclose that the texture layer outside of the substrate increases the efficiency of the device.

Therefore, it would have been obvious to one having ordinary skill in the art, at the time the invention was made, to modify the organic light emitting device of Hung to include that the output coupler is on the outside of the substrate, as taught by Lai et al., to increase the efficiency of the device.

Response to Arguments

20. The examiner asserts that the fluorocarbon insulating material of Hung is a Teflon-like material (column 4, lines 27-31). Teflon is a porous ceramic. Ceramics by nature are historically porous materials¹. The example given by the applicants of a non-porous ceramic is manufactured by resolidification of a ceramic melt. Hung never mentions the resolidification of a ceramic melt. Again the examiner asserts that Teflon is known to one of ordinary skill in the art as a porous ceramic.

21. Regarding claims 3-5, 7, 8, 14 and 17, the limitations of these claims do not include a ceramic output coupler **and** a glass or polymer substrate claimed.

¹ Ceramic materials are usually ionic or covalently-bonded materials, and can be crystalline or amorphous. A material held together by either type of bond will tend to fracture before any plastic deformation takes place, which results in poor toughness in these materials. Additionally, because these materials tend to be porous, the pores and

22. Claims 10 and 11 remain rejected since Teflon is porous material by definition.
23. The examiner does not find patentable subject matter in claim 20 or any claims depending from claim 20.

Final Rejection

24. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Contact Information

25. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anthony J. Canning whose telephone number is (571)-272-2486. The examiner can normally be reached on M-F 8:00-4:30.

other microscopic imperfections act as stress concentrators, decreasing the toughness further, and reducing the tensile strength.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh D. Patel can be reached on (571)-272-2457. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Anthony Canning *ac*

11 January 2006

Ashok
ASHOK PATEL
PRIMARY EXAMINER